

NEW BEES FROM THE MESA VERDE NATIONAL PARK, COLORADO

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When we examine the long list of North American bees, it seems that the fauna must be well known. But if we list the recorded localities, it at once becomes apparent that only a few regions have been at all adequately explored for these insects. There are, in fact, large areas from which we know little or nothing. It might be a useful and suggestive undertaking, at some future time, to list the localities from which insects of various orders are particularly to be desired, obtaining the information from various specialists. Then entomologists could take their holidays in this or that place, knowing in advance that every specimen collected would be of scientific interest. In some cases, no doubt, specialists could be found who would promise to work up and record such collections.

The Mesa Verde region, in southwestern Colorado, has hitherto been one of the blank spaces on the map, so far as bees were concerned. Mr. P. R. Franke, one of my students, made a small collection there last summer, and the results, given below, are sufficiently striking. Several of the new species are large and striking insects. Undoubtedly many more remain to be discovered, and a collector who will go there next year may be confident that he will find new and rare species.

How many species of bees are there in North America, or in the world? It is impossible to say, but perhaps a rough estimate may be made in this fashion. Robertson, in the vicinity of Carlinville, Illinois, examined the flowers of 263 genera of plants, and collected 297 species of bees. Perhaps, roughly, we may estimate one species of bee to each genus of insect visited plants. In Colorado, however, the proportion differs, the species of bees very considerably exceeding the number of genera of plants. This accords with the fact that bees are much more numerous and varied in dry regions. On islands it is likely to be all the other

way; thus New Caledonia, with a most remarkable and extensive flora, has only a few bees. Taking all these differences into account, it might be possible to estimate the probable number of kinds of bees in a region. Thus California, with its very peculiar flora, and many dry areas, would be expected to possess a very large fauna of endemic bees, and that is undoubtedly the case. It does not seem probable that the number of species of bees in a locality increases proportionately to the number of species of plants, when these do not represent additional genera. But in adjacent regions, when the same genera are represented by different species of plants, the species of bees may also be expected to differ. Altitude must also be considered,¹ but at present our data in respect to bees are very defective.

***Emphoropsis citulus* sp. n.**

♂. Length about 13.5 mm.; robust, black, with hair of head and thorax above pale fulvous, not mixed with black, of cheeks and sides of thorax long and pure white; front tufted with ochreous, sides of vertex with black hair directed forward; face with long white hair, but black hairs at sides; labrum black, with white hair; mandibles black; tongue extending far beyond labial palpi; eyes black; face marks pale yellow, consisting of clypeus (except broad lateral margins and an inwardly directed point above the middle from lateral bands), large thorn-shaped lateral face marks, and very broad supraclypeal triangular mark; scape with a broad yellow band; third antennal joint comparatively short, shorter than next two together; flagellum rather long, entirely dark; tegulae black; wings brownish hyaline; second cubital cell nearly square, receiving recurrent nervure a short distance from end; anterior legs with long white hair behind, with some black intermixed; middle and hind femora with black hair, the middle pair with a few pale hairs in front; middle and hind tibiae and tarsi with silky white hair, some black on inner side; spurs dark brown; abdomen with first two tergites thickly covered with erect ochreous tinted hair; remaining tergites covered with black hair, but a little patch of white at apex; sides of abdomen with some long white hairs.

Mesa Verde National Park, Colorado, July 12, 1929 (*Paul R. Franke*). Closely related to *E. johnsoni* (Ckll.), but easily known by the black hair or abdomen beyond second tergite. The venation shows that it is not the male of *E. mucidus* (Cresson). In my key in Bull. So. Calif. Acad. Sci., 1905, it runs next to *E. murihirta* Ckll., differing by the light-marked scape, and no mixture of black hair on thorax above.

¹ See Lutz, Bull. Amer. Mus. Nat. Hist., XLVI (1922), Art. V.

***Anthophora subignava* sp. n.**

♀. Very large and robust, like *A. ignava* Cresson, which it at first sight appears to be, but distinct by the long creamy-white hair on scutellum and adjacent parts, with a very few dark hairs on scutellum, though the vertex (as in *A. ignava*, but not in *A. porterae*) has long black hair; first abdominal tergite with very long creamy-white hair; second with shorter erect white hair, and a very little black subapically; margins of the second and third tergites with entire, thin, but rather conspicuous bands of white hair; discs of third and fourth tergites with erect black hair; fifth with much black hair, but sides of third to fifth with much long white hair. Eyes dark grey or black (green in *A. ignava*); flagellum entirely black; third antennal joint very long (about 1.5 mm.); tegulae black; wings brownish; abdominal tergites distinctly greenish at sides; legs nearly as in *A. ignava*. The distance between the tegulae is 5 mm., and the wings are nearly 13.5 mm. long.

Mesa Verde National Park, Colorado, May 8, 1929 (*Paul R. Franke*).

***Nomada frankei* sp. n.**

♂. Length about 8.2 mm., anterior wing 6.2; hair of head and thorax pale fulvous above, white below; head, thorax and abdomen with light lemon yellow markings, and no red; mandibles (except apex), labrum, clypeus (broadly separated from lateral marks except below), lateral face marks (very broad below, then rapidly narrowing to a narrow band along orbits to level of antennae, slightly enlarged at top), and stripe behind eyes below, all yellow; scape greatly swollen, entirely yellow in front, black behind; flagellum stout, bright ferruginous, the first four joints black above; third antennal joint about half length of fourth (more than half on longer side); yellow of thorax confined to tubercles, line on upper edge of prothorax, and a pair of large round spots on scutellum; tegulae light yellow, with a small brown spot; wings darkened apically, stigma clear red; basal nervure meeting nervulus; first recurrent ending beyond middle of second cubital cell; legs with coxae and trochanters marked with yellow in front; anterior femora, tibiae and tarsi yellow in front, red behind, except that femora and tibiae are yellow at apex, and the femora have a long black band, and the tibiae a black mark; middle and hind femora red in front and black behind, but apex broadly yellow; middle and hind tibiae marked with red, black and yellow, their tarsi pale red, the basitarsi with a yellow mark at base; abdomen with six broad entire light yellow bands, the apical margins of the tergites black or dark brown; first tergite black with a broad yellow band, emarginate in middle anteriorly; venter with very broad yellow bands.

Mesa Verde National Park, Colorado, June 22, 1929 (*Paul R. Franke*). Very closely allied to *N. pascoensis* Ckll., of the states bordering the Pacific. It differs by the ordinary (not produced

and pointed) last antennal joint, the black on each side of upper part of clypeus, the very dark green eyes, the immaculate post-scutellum, the narrower, feebly notched apical plate of abdomen, etc. It also resembles *N. civilis* Cresson, differing by the coloration of the legs, etc.

***Andrena viridibasis* sp. n.**

♀. Length about 10 mm.; head and thorax black, with front and vertex dark blue, region above front legs shining green, metathorax obscurely blue; tegulae and legs black; abdomen dullish, without bands, very closely and finely but conspicuously punctured, first tergite olive green, the others rich dark blue, the apical depressions concolorous and equally punctured; pubescence entirely black, scopa of hind legs dense and compact; clypeus shining, sparsely but strongly punctured, with a smooth median ridge; third antennal joint about as long as next two together; disc of mesothorax highly polished, with scattered weak punctures; anterior margin of scutellum shining; area of metathorax entirely dull, without evident sculpture; wings hyaline, faintly orange-tinted, with the outer margin broadly dilute fuliginous; stigma ferruginous; nervures rather pale fuscous; basal nervure meeting nervulus; second cubital cell receiving recurrent nervure at middle; second tergite in middle depressed about a third.

Mesa Verde National Park, Colorado, June 17, 1929 (*Paul R. Franke*). A second specimen is somewhat smaller, with the abdomen less brightly colored. This species is in all respects very close to *A. bruneri* Vier. & Ckll., from Wyoming. It differs by the concolorous hind margins of tergites, the shining mesothorax, the dusky nervures, and the position of the first recurrent nervure. The green first tergite is also characteristic. It is also allied to *A. hicksi* Ckll., but the wings are differently colored, the abdomen is much more distinctly punctured, and there is no broad shining space below the anterior ocellus. It may represent no more than a local race of *A. bruneri*, but it seems best to treat it as a distinct species.

***Andrena speculifera* sp. n.**

♀. Length about 9 mm.; black, head and thorax with fulvous hair, brighter and redder above, short on thoracic dorsum; mandibles and antennae entirely black, tegulae very dark brown; malar space linear; process of labrum obtusely emarginate, its base with transverse striae; clypeus convex, highly polished, with widely scattered distinct punctures; facial foveae narrow, pale fulvous, overlapped by long fulvous hairs; third antennal joint not very long, but as long as next two together; mesothorax dull anteriorly,

but the posterior disc and the scutellum highly polished and shining; area of metathorax entirely dull, without evident sculpture; wings dusky hyaline, darker apically, stigma ferruginous, nervures pale fuscous; basal nervure falling short of nervulus; second cubital cell broad, receiving recurrent nervure slightly before the middle; legs black, with the hind tibiae and tarsi clear red; scopa of hind tibiae pale fulvous, very short and sub-appressed; hair on inner side of hind basitarsi reddish orange; abdomen moderately shining, very minutely, not very conspicuously, punctured; tergites 2 to 4 with dense entire pale fulvous hair bands; apex with pale fulvous tinted hair.

Mesa Verde National Park, August 1, 1929 (*Paul R. Franke*). This could be taken for *A. medionitens* Ckll., but for the much narrower facial foveae and the pale fulvous abdominal bands. It is very like *A. auricoma* Smith, but differs at once in the clypeus, which is similar to that of *A. pronitens* Ckll. The entirely black flagellum separates it at once from *A. montrosensis* V. & C.

***Andrena (Trachandrena) abjuncta* sp. n.**

♀. Length about 11 mm., anterior wing 10.3; black, with black hair, but that of mesothorax, scutellum, postscutellum and fringe of tubercles erect, dense, and creamy-white; depression of second tergite shining, extending nearly to base in middle, those on third and fourth involving nearly a third of tergite in middle; process of labrum large and broadly truncate; third antennal joint rather short, not as long as next two together; facial foveae seen from above dark seal brown, rather broad, separated from orbit by a shining band; antennae and tegulae entirely black; clypeus coarsely and extremely densely punctured, with a slight median ridge visible with a side light, but no trace of a smooth band; surface of mesothorax hidden by hair; scutellum dull and closely punctured; area of metathorax with strong even longitudinal plicae; wings dilute brown, stigma and nervures very dark; basal nervure meeting nervulus; second cubital cell receiving recurrent nervure much beyond the middle; spurs black; abdomen shining, without bands, rather weakly punctured, but raised parts of tergites at sides closely and evidently punctured; tergites without conspicuous erect hair. In all respects very close to *A. swenki* Vier. & Ckll. from Idaho, but dark hair pure black, hair on under side of front femora black; clypeus with no smooth line; foveae darker; tegulae black. It may have to rank as a subspecies of *A. swenki*. The spur on middle tibia is abruptly bent at end, forming a hook.

Mesa Verde National Park, Colorado, July 6, 1929 (*Paul R. Franke*).

***Andrena heterura* sp. n.**

♀. Length about 14 mm.; a species with the aspect of *A. vicina* Sm., with dense creamy white pubescence on head and thorax above, as well as

tubercles, scanty and black on face, with a little white at sides near the antennae (easily overlooked), black on cheeks, pleura, legs and abdomen, mostly dull white on metathorax; process of labrum large, truncate; clypeus densely punctured, without a longitudinal elevation or smooth line, but lower middle with a shining stripe, representing the lower end of a smooth band; antennae and tegulae black, the latter covered anteriorly with pale hair; third antennal joint about as long as next two together; facial foveae broad, very dark brown, going some distance below level of antennae; mesothorax dull, very hairy; area of metathorax without evident sculpture; wings strongly dusky; stigma small, dusky red with a dark margin; nervures dark brown; basal nervure meeting nervulus; second cubital cell broad, receiving recurrent nervure at middle; spurs black; abdomen without bands, no erect dorsal hair; tergites dullish, faintly greenish, very finely and weakly punctured; second tergite depressed about a third.

Mesa Verde National Park, Colorado, June 29, 1929 (*Paul R. Franke*). A peculiar species, running in my manuscript tables to the vicinity of *A. errans* Smith and *A. carliniformis* Vier. & Ckll., but with the abdomen having a dullish, greenish, surface; an approach to the condition of *A. subtilis* Smith. It would not be classed among the metallic species, the green being so obscure as only to be evident on comparison with the pure black of related forms. The type of *A. heterura* had collected two entirely different sorts of pollen, very bright orange on the hind femora, and creamy white on the tibiae.

***Andrena (Pterandrena) platyrhina* sp. n.**

♀. Length about 12.5 mm., anterior wing 10; black, robust, head and thorax with pale fulvous hair throughout; facial quadrangle broader than long; mandibles and antennae black; tongue very short; process of labrum binodose; malar space rather well developed; clypeus rather long, shining, distinctly but not densely punctured, flattened in middle, and with a fine median keel; sides of face with long spreading fulvous hair; third antennal joint about 480 μ long, equal to next two together; facial foveae very broad, light fulvous, very close to orbits; hair of scutellum dense at each side, and very red; mesothorax dull, scutellum slightly shining, finely punctured; postsutellum large; area of metathorax dull and granular, hardly defined; tegulae hairy, very dark brownish; wings dusky, but not reddened; stigma moderate, dark reddish; nervures dark fuscous; basal nervure meeting nervulus; second cubital cell broad, receiving recurrent nervure about middle; legs black, with very pale fulvous tinted hair, orange-ferruginous on inner side of tarsi, floccus on hind femora white, tuft on hind knees warm reddish; spurs ferruginous; abdomen dullish, very finely punctured, second tergite depressed hardly a third, the depression weak; tergites 2 to 4 with

pale fulvous hair-bands, the first two rather broadly interrupted; caudal tuft bright coppery red.

Mesa Verde National Park, Colorado, June 26, 1929 (*Paul R. Franke*). The pollen collected is cream color, the grains elongated, rounded at each end, smooth, with a longitudinal line. They are about $23\ \mu$ long. The individual grains appear colorless under the microscope. *A. platyrhina* is much like *A. helianthi* Rob., but is known by the dusky wings, with larger stigma; the longer clypeus, flattened in middle; the much redder hair at apex of abdomen, etc. The hair at apex of abdomen is about as in *A. sayi* Rob.

***Andrena (Trachandrena) tardula* sp. n.**

♀. Length about 8 mm.; black, hair of head and thorax long and abundant, dull white, faintly creamy dorsally; facial quadrangle broader than long; antennae and mandibles black; third antennal joint very short, not much longer than fourth; facial foveae dull white, rather broad; clypeus shining, strongly and densely punctured, with no median ridge or smooth line; front dull, closely punctured and more or less striate; scutellum and disc of mesothorax shining, with distinct well separated punctures; area of metathorax large, dull, with strong irregular plicae, partly Y-shaped, with the fork posterior, the surface between the plicae minutely striate; tegular dark in front, pale reddish behind; wings hyaline; stigma large, dusky reddish, nervures fuscous; basal nervure meeting nervulus; first cubital cell very long, second small, square, receiving recurrent nervure at apical corner; third cubital cell long; legs black, with white hair, creamy white on inner side of hind basitarsi; abdomen shining, finely punctured, hair bands white, that of first tergite thin and poorly developed, of second to fourth well developed and conspicuous; apical region with white hair, a little fulvous at tip, at extreme apex two little tufts of black hair, giving the impression under a lens of a bidentate apical plate.

Mesa Verde National Park, Colorado, August 7, 1929 (*Paul R. Franke*). The date is very late for a *Trachandrena*, but the specimen is quite fresh. It is very close to *A. claytoniae* Rob., which flies in the spring, but the wings are faintly greyish, not reddish, the stigma is darker, the hind tibiae and tarsi are black. The depression of the second tergite does not differ. The stigma is conspicuously larger than *A. daeckei* Vier., which flies in July in Maine.

In addition to the new species, Mr. Franke collected in the Mesa Verde Park last summer the following: *Osmia wilmattae*

Ckll., *O. gaudiosa* Ckll., *Lithurgus apicalis* Cress., *Heteranthidium occidentale* Cress., *Apis mellifera ligustica* Spinola, *Agapostemon texanus subtilior* Ckll., *Proteraner leptanthi* Ckll., *Nomada pecosensis* Ckll. (♀, Aug. 6), *N. crawfordi* Ckll. (♂, Aug. 6), *Bombus morrisoni* Cress., *B. bifarius* Cress., *Halictus trizonatus* Cress., *Andrena argentiniae* Ckll. (June 29 and July 6), *Bombomelecta fulvida* Cress., *Xenoglossodes excurrentis* Ckll., *Anthophora neomexicana* Ckll., *A. similima* Cress., *A. porterae* Ckll.